

**EPA Superfund
Record of Decision:**

**OAK RIDGE RESERVATION (USDOE)
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DOE/OR/02-1545&D2

Record of Decision
for an Interim Action for Union Valley,
Upper East Fork Poplar Creek Characterization Area,
Oak Ridge, Tennessee

Date Issued-April 1997

Prepared by
Jacobs EM Team
125 Broadway Avenue
Oak Ridge, Tennessee
under contract DE-AC05-93OR22028

Prepared for
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PREFACE

The Record of Decision for an Interim Action for Union Valley, Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee (DOE/OR/02-1545&D2) was prepared in accordance with requirements under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and documents the selected interim remedy. This work was performed under Work Breakdown Structure 1.1.03.41.10.20.15.04 (Activity Data Sheet 2303, "Upper East Fork Poplar Creek"). This document provides the Environmental Restoration Program with information about the interim institutional controls remedy selected for Union Valley. Information in this document summarizes information from the Administrative Record including the interim proposed plan (DOE/OR/02-1452&D2).

ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
CA	characterization area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DNAPL	dense nonaqueous-phase liquid
DOE	U.S. Department of Energy
EFPC	East Fork Poplar Creek
Energy Systems	Lockheed Martin Energy Systems
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
FFA	Federal Facility Agreement
FS	feasibility study
ft	foot
gal	gallon
km	kilometer
L	liter
lb	pound
m	meter
MCL	maximum contaminant level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ORR	Oak Ridge Reservation
PCE	tetrachloroethene
ppb	parts per billion
RI	remedial investigation
ROD	record of decision
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
UT	University of Tennessee
VOC	volatile organic compound

PART 1. DECLARATION

SITE NAME AND LOCATION

U.S. Department of Energy
Oak Ridge Reservation
Union Valley
Upper East Fork Poplar Creek Characterization Area
Oak Ridge, Tennessee

STATEMENT OF BASIS AND PURPOSE

This record of decision (ROD) presents the selected interim remedial action for Union Valley, a site adjacent to the U.S. Department of Energy (DOE) Oak Ridge Y-12 Plant on the Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee, and included in the scope of the Upper East Fork Poplar Creek (EFPC) Characterization Area (CA). The interim action was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, 42 United States Code Section 9601 et seq., and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations 300).

The ROD is based on the administrative record for the Upper EFPC CA, which includes an interim proposed plan for Union Valley (DOE 1996) and other documents in the administrative record file for this site.

This document is issued by DOE as the lead agency for environmental restoration (ER) activities on the ORR. U.S. Environmental Protection Agency (EPA)-Region IV and the Tennessee Department of Environment and Conservation (TDEQ) are supportive agencies - as parties of the Federal Facility Agreement (FFA) for this response action and concur with the selected remedy.

ASSESSMENT OF THE SITE

A carbon tetrachloride-dominated contamination plume originating under the Y-12 Plant has been detected in the groundwater below privately owned land in Union Valley. There are no current users of the groundwater. However, there is a potential risk to human health from ingestion of contaminated groundwater and a possibility that actions taken by property owners could cause the contamination plume to expand. Therefore, actual or threatened releases of hazardous substances from the Y-12 Plant, if not addressed by implementing the interim response action selected in the ROD, may present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This response action fits into the overall ORR cleanup strategy by addressing, groundwater contaminated with carbon tetrachloride in the Union Valley portion of the Upper EFPC CA. The purposes of this interim action are to:

- ensure that public health is protected while final actions are being developed and implemented and
- identify and, if necessary, prohibit future activities with a potential to accelerate the rate of contaminant migration from the CA or increase the extent of the contaminant plume.

DOE has selected an institutional controls interim remedy for the site to accomplish these goals. The selected action consists of:

- license agreements with property owners notifying them of the potential contamination and requiring them to notify DOE of any changes in use of groundwater or surface water in certain areas and
- appropriate verification by DOE of compliance with the agreements and notification of state and local agencies.

No monitoring will be conducted as part of this ROD. Watershed management monitoring by DOE outside the scope of this interim action and monitoring by state agencies may provide data on Union Valley for use on future remediation decisions. The monitoring and the licensing agreements will provide, at a minimal cost, institutional controls that help ensure the site continues to pose no unacceptable human health risk.

STATUTORY DETERMINATIONS

This interim action protects human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate requirements (ARARs), and is cost-effective. No ARARs are associated with this limited action. This is a limited interim action that does not use permanent solutions or alternative treatment (or resource recovery). Because this action does not constitute the final remedy for Union Valley, the statutory preference for remedies that reduce toxicity, mobility, or volume as a principal element will not be satisfied by this interim action. Subsequent actions that address fully the principal threats in Union Valley will be implemented for the Upper EFPC CA.

PART 2. DECISION SUMMARY

SITE NAME, LOCATION, AND DESCRIPTION

Union Valley lies east of the DOE Y-12 Plant and extends approximately 5.8 km (3.6 miles) from Scarboro Road to Melton Lake Drive in the city of Oak Ridge, Tennessee (Fig. 2.1). The valley is bounded by Pine Ridge to the north and Chestnut Ridge to the south. Illinois Avenue transects the area 1 km (0.6 miles) east of Scarboro Road. Union Valley Road runs the length of the valley. Most properties in the Union Valley corridor are privately owned tracts of variable size, although the city of Oak Ridge and the University of Tennessee (UT) also own land there. The portion of the valley that has contamination resulting from release at the Y-12 Plant is included in the Upper EFPC CA.

Following is a brief description of several aspects of the site. More site description details are found in the Union Valley Interim Study Remedial Site Evaluation (ORNL 1995).

Union Valley is within the city limits of Oak Ridge, which has a population of 27,000. Industrial, residential, and office expansion of Oak Ridge has occurred in several directions, including Union Valley. Future growth in the area is expected.

The Maynardville Limestone bedrock unit underlying the Y-12 Plant and Union Valley is of particular interest because it is the primary pathway for contaminant migration from the plant (ORNL 1995). Contaminants consistent with those found in the carbon tetrachloride-dominated plume of contaminated groundwater originating under the Y-12 Plant were detected in one of the six monitoring wells in the Maynardville Limestone in Union Valley and in two springs that feed Scarboro Creek near Illinois Avenue. Contamination detected in a shallow well in Union Valley may be connected with a shallow plume of tetrachloromethane (PCE) and trichloroethene (TCE) originating at the Y-12 Plant or may originate from a source in Union Valley off ORR. None of the current landowners in Union Valley extract groundwater for residential use.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

On November 21, 1989, EPA placed ORR on the National Priorities List under CERCLA. On January 1, 1992, DOE, EPA, and TDEC implemented an FFA to provide a procedural framework and schedule for evaluating, prioritizing, and managing areas of contamination on ORR. The agreement also specifies that CERCLA procedures be followed to evaluate and remediate contamination problems.

The Y-12 Plant is one of three major plants at ORR. Built in 1943, the plant served as a research, development, and process facility in support of the Manhattan Project. Uranium isotopes were separated at the Y-12 Plant, which also provided manufacturing and developmental engineering for nuclear weapons. The Y-12 Plant's current mission is technology development and weapons disassembly.

A remedial investigation (RI)/feasibility study (FS) is currently underway for the Upper EFPC CA. The RI/FS report will develop long-range remedial alternatives that will address contamination from the main area of the Y-12 Plant throughout the CA, including Union Valley. However, final remedial action for the CA is unlikely to occur within the next 4 years. This interim action is being taken to ensure that the public is protected from contaminants

transported by groundwater until final action is taken.

The interim proposed plan evaluated potential interim actions in accordance with the requirements of CERCLA and NCP. The proposed plan presented DOE's determination that the institutional controls action is necessary and solicited public comment on that determination. Part 3 of this ROD, the "Responsiveness Summary," documents public comments and DOE's response. This ROD documents the selected interim remedy for Union Valley.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The interim proposed plan was released for public comment August 5, 1996. The notice of the availability of the plan and other documents in the administrative record was published in The Oak Ridger, The Knoxville News-Sentinel, and the Roane County News newspapers August 5, 1996. The administrative record file contains all the documentation DOE considered in selecting the interim remedial action for Union Valley and is available at the Information Resource Center, 105 Broadway Avenue, Oak Ridge, Tennessee 37830. A 30-day public comment period for the proposed plan began August 6, 1996. On August 7, 1996, a public availability session was held that included a presentation on Union Valley. The public was informed that a public meeting specific to Union Valley would be held, if requested. None was requested, and the public comment period ended September 5, 1996. Comments recorded during the public availability session and written comments received from three organizations and one individual within the public comment period are addressed in the "Responsiveness Summary" of this document.

DOE ER PROGRAM AND SCOPE OF UNION VALLEY INTERIM ACTIONS

The goals of the DOE ORR ER Program include achieving compliance with environmental regulations that protect human health and the environment and reducing risks to human health and the environment resulting from contaminated, inactive, DOE disposal sites or contaminant releases. Some of the operable units under the overall ER Program are on ORR but not within the boundaries of the Y-12 Plant, Oak Ridge K-25 Site, or Oak Ridge National Laboratory. DOE has adopted a watershed approach for remediation of ORR. A watershed is defined as a surface drainage basin that includes one or more contaminated areas to be investigated. The Upper EFPC CA is a watershed that includes most of the main Y-12 Plant and the full extent of the plume of contaminated groundwater that has migrated off ORR and into Union Valley.

This ROD addresses only the plume of contaminated groundwater that has migrated beyond the Y-12 Plant boundaries. Future CERCLA activities may be conducted at all or part of the Upper EFPC CA in association with other interim, early, and final actions. There may be sources of contamination in Union Valley that do not originate from the Y-12 Plant. This interim remedial action is not intended to address other contamination sources. However, the selected interim remedy will mitigate potential human health risks, if any, from any source of groundwater contamination in the Union Valley interim remedial action boundary. The responsibilities of DOE and TDEC to investigate other sources and mitigate any unacceptable risks outside the scope of this action are discussed in "Site Characteristics," "Selected Remedy," and "Responsiveness Summary."

SUMMARY OF SITE CHARACTERISTICS

There are six groundwater monitoring wells in Union Valley (three wells at different depths in each of two locations). Carbon tetrachloride has been detected in one of these wells and at two springs near Illinois Avenue and the UT Arboretum. Several other organic, inorganic, and

radiological constituents were also detected in the groundwater and springs. According to process history, carbon tetrachloride was considered the constituent of potential concern, which indicated at least some of this contamination originated from the Y-12 Plant. Surface water has been used in the past for irrigation at the arboretum. Some contaminants have been detected in the surface water, but none other than carbon tetrachloride were found at levels of regulatory or risk-based concern. A complete enumeration of all contaminants and their measured concentrations is in the 1995 Union Valley Interim Study Remedial Site Evaluation (Y/ER-206/R1), which is available in the Administrative Record for the site. In addition to contamination originating from the Upper EFPC CA by groundwater, other potential sources nearby could contaminate groundwater or surface water. The TDEC Division of Superfund has been notified of the existence of potential contamination sources in Union Valley outside the ORR boundary and is initiating an investigation.

The carbon tetrachloride-dominated plume source is under the east end of the Y-12 Plant where very high concentrations of carbon tetrachloride (up to 8,500 ppb) and lower concentrations of other contaminants (chloroform, PCE, and TCE) have been detected. The plume contaminants have been detected in much lower concentrations (up to 200 ppb) in a well at depths of 30-46 m (100-150 ft), 550 m (1,800 ft) east of the Y-12 Plant boundary in Union Valley. Samples from shallower and deeper wells at this location did not contain contaminants clearly linked to this source, although low levels of PCE and TCE were detected in the shallow [9-m (30-ft)-deep] wells. Carbon tetrachloride was detected at 7 ppb in springs at the headwaters of Scarboro Creek near Illinois Avenue 850 m (2,800 ft) east of the Y-12 Plant boundary. The contaminated groundwater is thought to surface at the creek; a groundwater divide is thought to be just east of Scarboro Creek. No carbon tetrachloride was detected in the shallow, intermediate, or deep wells that are 400 m (1,300 ft) east of Scarboro Creek. Groundwater contamination originating from the Y-12 Plant is thus thought to have migrated no farther east than Scarboro Creek.

None of the current landowners in Union Valley extract groundwater for residential use; no groundwater extraction wells are planned. Rogers Group, Inc., quarry on lot Excess (613) near the eastern end of Union Valley, 3,700 m (12,000 ft) east of the Y-12 Plant, pumps out some groundwater to maintain a dewatered working area. The water is discharged to surface water and is not used for drinking or other industrial purposes. No contamination has been detected in the quarry groundwater.

The Union Valley interim remedial action boundary is shown on Figure 2.2. The boundary is intended to address any contamination originating from the Upper EFPC CA that could be transported off site by groundwater. The only known groundwater plume originating from the Upper EFPC CA is the carbon tetrachloride-dominated plume that extends from the eastern Y-12 Plant boundary (all directions refer to administrative north) to Illinois Avenue. Carbon tetrachloride, a Class B2 (probable) human carcinogen, has been detected in two springs that feed Scarboro Creek.

The western boundary of this remedial action is the eastern Y-12 Plant property line. The eastern limit of the boundary is lot Excess (613), the quarry property. From 1943 to 1946, large quantities of carbon tetrachloride were used at the Y-12 Plant for electromagnetic separation of uranium. Groundwater contamination probably began at that time. The quarry has operated for more than a decade, and no contamination has been detected since sampling began in 1995. Because the quarry extends into the Maynardville Limestone (the primary transport pathway for the known plume) and groundwater seeping into the quarry is collected and discharged, even if the plume expands east of Scarboro Creek, it is unlikely that the plume could migrate almost 3 km (2 miles) farther east past the quarry.

The plume in Union Valley is assumed to be contained in the Maynardville Limestone, which runs parallel to the valley. This limestone formation contains a better developed karst system than adjacent formations, and water from the adjacent formations flows toward the Maynardville Limestone. For this reason, the northern boundary is defined by the northern edge of the Maynardville Limestone at the surface. The southern boundary is defined by the southern edge of the Maynardville Limestone, which dips about 45 degrees to the south, at a depth of 300 m(1,000 ft). Little contamination is expected at 300 m(1,000 ft) and below because there are fewer developed karst features at those depths and the formation is much tighter. Furthermore, it is unlikely that groundwater extraction wells would be drilled to those depths because of the expense and the low likelihood of finding a region that could produce usable quantities of water.

An extension of the boundary to the south includes the properties adjacent to Scarboro Creek. Contamination from the groundwater plume reaches the surface in seeps and springs that feed the creek. Contaminated groundwater from the plume could possibly flow southward into the shallow overburden above the bedrock along Scarboro Creek. Bethel Valley Road is the southern boundary of the extension because DOE owns the property south of the road and institutional controls under other programs are sufficiently protective.

The land over the known extent of the carbon tetrachloride dominated plume (see Fig. 2.1) is zoned by the city of Oak Ridge as "Industrial District 2." Most of the land in Union Valley east of Illinois Avenue is zoned as "Forestry, Agriculture, Industry, and Research District" and is part of the arboretum. Other small parcels east-of the plume are designated as "Residential, Open Space, and Reserved District" and "Industrial District 2." The nearest "One-Family Residential District" is about 3.6 km (2.25 miles) east of the known extent of the plume. Figure 2.2 identifies the zoning designations and properties in the subject area.

SUMMARY OF SITE RISKS

A baseline risk assessment will be completed as part of the Upper EFPC CA RI. The CA includes the carbon tetrachloride-dominated plume and the two springs where the plume has surfaced. Preliminary results of a human health risk screening evaluation were reported in the Union Valley interim study (ORNL 1995). Some contaminants in the groundwater and a very few contaminants in the springs that feed Scarboro Creek would pose a threat to human health under a residential ingestion scenario. Because the water is not used for residential or industrial purposes, there are no currently unacceptable risks. The potential health risk to a child wading in Scarboro Creek is within acceptable limits, according to the preliminary evaluation.

A thorough investigation of potential harm to the environment will be deferred to the decision documents for the Upper EFPC CA. In preliminary investigations, two organic chemicals were detected in surface water in Union Valley. The measured concentrations of both compounds were well below the ecological toxicological benchmark for aquatic biota.

DESCRIPTION OF THE ALTERNATIVES

Only two Interim actions, no action and institutional controls, were considered in the interim proposed plan because final decisions regarding remedial actions affecting Union Valley will not occur until completion of Upper EFPC CA studies.

ALTERNATIVE 1-NO ACTION

The NCP requires consideration of a no action alternative to serve as a baseline for comparison with other alternatives. If no interim actions are implemented in Union Valley, existing zoning and other municipal ordinances and county and state regulations would continue as the only controls on the use of property and groundwater. Monitoring of Union Valley would not be required under the no action alternative.

ALTERNATIVE 2-INSTITUTIONAL CONTROLS

This alternative is based on a strategy for implementing institutional controls to prevent potentially unacceptable exposure to contamination and to reduce its potential spread during the interim period until final decisions are made for the Upper EFPC CA.

DOE entered into license agreements with all affected property owners within the interim remedial action boundary. These agreements require property owners who are not currently extracting or using groundwater or surface water to notify DOE 90 days before any extraction or use is proposed. Owners of the quarry [lot Excess (613)] and lot Excess (arboretum) would agree to notify DOE 90 days before any proposed new extraction or use or before any change in current use such as use of groundwater or surface water for drinking or food crop irrigation. No other owners currently extract or use groundwater or surface water.

Upon notification of proposed use or change in use of surface water or groundwater, DOE would evaluate the intended use. If the use is unacceptable, DOE would negotiate a separate agreement with reasonable terms under the circumstances to connect the owner to the existing municipal water system or other appropriate water supply.

In addition, DOE will conduct an annual title search to determine whether any affected property changed hands and, if so, verify that the new owner has been notified of the provisions of the license agreement. DOE will also write annually to property owners reminding them of their obligations under the agreement.

No monitoring would be required by this alternative. Monitoring of Union Valley groundwater and surface water contamination may continue as part of DOE watershed management monitoring for use in future remediation decisions.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The two alternatives in the interim proposed plan were evaluated against the nine criteria developed by EPA to measure overall feasibility and acceptability of remedial alternatives. The first two criteria are threshold criteria and must be met in initial screening of any alternative considered for selection in the ROD. The next five criteria are balancing criteria and represent the primary criteria upon which the analysis is based, taking into account technical, cost, institutional, and risk considerations. The final two modifying criteria were evaluated after a regulatory agency review and a public comment period.

THRESHOLD CRITERIA

1. Overall Protection of Human Health and the Environment

Alternative ensures that all current and future property owners are aware of the potential risk from drinking contaminated surface water or groundwater. This should adequately protect human health. Control of additional extraction of groundwater would mitigate the further spread of contamination. Therefore, Alternative 2 will protect human health more effectively than the no action alternative.

The no action alternative may not adequately protect human health because human health could be adversely affected from ingestion of groundwater or surface water in Union Valley. The only existing controls on such use are federal, state, and county regulations and municipal zoning and ordinances. Tennessee state law prohibits construction of new wells for the purpose of production of water from underground sources "at other than a safe distance from any known potential source of contamination" [TDEC 1200-4-9-.10(2)(a)] and requires installation of water filters and treatment units "to accommodate water quality problems" [TDEC 1200-4-9-.11 (10)]. Well drillers must be licensed, but there are no requirements for verifying the absence of contamination sources before drilling. Drillers are required to submit a report to TDEC within 30 days after completion of a water well. These existing controls will reduce the likelihood of human consumption of Union Valley groundwater, but may not preclude such consumption. This interim action is not intended to address ecological risks, if they exist.

Under the no action alternative, additional groundwater wells could be installed in the Maynardville Limestone in Union Valley and groundwater could be extracted for drinking or industrial use. The contamination plume originating in the Y-12 Plant comes to the surface at natural hydraulic gradients caused by a groundwater divide east of the creek, it is believed that the plume does not migrate farther to the east. Extraction of significant volumes of groundwater from the assumed uncontaminated region east of Scarboro Creek could affect this natural groundwater divide and cause contaminated groundwater to flow east of the creek, expanding the areal extent of the plume. Extraction of groundwater in the contaminated region between the Y-12 Plant and Scarboro Creek (at Illinois Avenue) could also accelerate contaminant migration and put potential consumers of that groundwater at risk.

2. Compliance with Applicable or Relevant and Appropriate Requirements

On-site interim remedial actions under CERCLA are required to comply with only those ARARs specific to the interim action being implemented.

Alternative 2 would not trigger any location-specific ARARs because this alternative would not affect any sensitive resources. Water quality standards and Safe Drinking Water Act maximum contaminant levels (MCLs) (which could be ARARs for the groundwater and the springs during a final action) and other chemical-specific ARARs are outside the scope of this interim action because no actions will be taken to alter contamination levels. The final action for this site will be taken as part of the Upper EFPC ROD, which will address Union Valley groundwater. MCLs will be ARARs for setting cleanup goals for that action. Chapter 1200-1-13-.08(3)(a)(iv) of TDEC final Rule, "Inactive Hazardous Substance Site Remedial Action Program," effective February 19, 1994, requires institutional controls whenever a remedial action does not address concentrations of hazardous substances that pose or may pose an unreasonable threat to public health, safety, or the environment. This rule, however, is applicable to actions "...consistent with a permanent remedy..." and is not applicable to this interim action. Alternative 2 is an administrative remedy for an interim action and, therefore, there are no location-, chemical-, or action-specific ARARs pertaining to the proposed actions.

A statutory requirement under CERCLA [Sect. 121(b)(1)] requiring protection of human health and the environment would not be met by the no action alternative without some assurance that exposure pathways would remain incomplete in the future.

BALANCING CRITERIA

3. Long-Term Effectiveness and Permanence

For Alternative 2, long-term effectiveness is evaluated for the period beginning when initial institutional controls (i.e., executing license agreements) are implemented per this interim action ROD and ending when final remedial actions are implemented per the Upper EFPC CA ROD. The interim actions include notification by property owners of use or change of use of surface water or groundwater, prohibition of any unacceptable actions, and annual title searches and notifications by DOE as a due-diligence measure to identify undisclosed changes in ownership and remind owners of their obligations. These actions are considered very effective for this interim period.

The no action alternative would not effectively preclude unacceptable extraction or use of surface water or groundwater in the long term. Therefore, the no action alternative would not be effective in the interim period or the long term.

4. Reduction of Toxicity, Mobility, and Volume Through Treatment

Neither alternative includes treatment to reduce toxicity, mobility, or volume of contamination. This was not considered practical for an interim action.

5. Short-Term Effectiveness

Short-term effectiveness considers the time needed for an alternative to achieve objectives and the risks to workers, residents, and the environment during implementation. For Alternative 2, the short term is the period until license agreements are executed.

Alternative 2, institutional controls, is considered very effective in the short term for the following reasons: (1) No one is currently at risk from contamination at the site. (2) License agreements have been implemented. (3) There will be little or no risk to workers.

No additional time is required to implement Alternative 2 because all property owners have signed the license agreements with DOE. Compliance with the license terms, ensured by DOE's annual title searches and notifications, would protect future purchasers of affected properties. Current owners have been made aware of the contamination and are unlikely to change their current safe practices. Thus, they are protected now.

Implementation of the no action alternative requires no time, and there is no risk to human health or the environment resulting from implementation. Risks are limited to potential, not actual exposures; because no one currently uses groundwater for drinking, short-term effectiveness is high. However, the alternative does not achieve the response objectives of mitigating future risks and reducing further potential expansion of the plume and cannot be selected as the preferred alternative.

6. Implementability

Executing the license agreements and performing the annual title searches and notifications for Alternative 2 would be straightforward. No actions are required for Alternative 1.

7. Cost

The costs for the institutional controls alternative are as follows. Executing license agreements with the 19 current landowners for new or changed groundwater or surface water use notifications cost a total of approximately \$22,500. Annual title searches, fees, and notifications would cost approximately \$6,900/year for the assumed 4-year duration of the

interim actions. No cost has been projected for agreements to prohibit unacceptable uses of groundwater or surface water. No such uses are expected during the interim action period, and the cost for an agreement, if any, would be highly uncertain and site-specific. The present value of the capital and annual costs for the institutional controls alternative would be approximately \$50,000.

No costs are associated with the no action alternative.

MODIFYING CRITERIA

8. State/Support Agency Acceptance

The state of Tennessee and EPA prefer Alternative 2 to ensure protection of human health during the interim period before final actions are taken for the Upper EFPC CA.

9. Community Acceptance

The property owners in Union Valley are the members of the community most affected by the proposed actions. All affected owners have executed license agreements with DOE, thus indicating their concurrence with the actions proposed for Alternative 2. Comments from the public on the proposed plan have been considered. Most commentors requested clarifications regarding the nature of the contamination and the schedule for final actions, rather than changes in strategy for the preferred interim alternative. Clarifications and other responses are provided in the "Responsiveness Summary." Based on input from property owners and the public, DOE considers Alternative 2 to be consistent with community preference and necessary to protect human health.

SELECTED REMEDY

DOE has selected Alternative 2, Institutional Controls, as the most appropriate interim action for the Union Valley portion of the Upper EFPC CA. The decision is based on CERCLA requirements, the comparative analysis of alternatives in the interim proposed plan (DOE 1996a), and public comments. EPA and TDEC concur with the selection.

The selected remedy is protective of human health. There are no ARARs for the selected remedy, which also meets the remaining criteria. This remedy does not satisfy the statutory preference for remedial actions that use treatment to reduce toxicity, mobility, and volume; however, DOE believes this interim remedy will be adequately protective at a reasonable cost. No ecological risks have been identified; however, this remedy would not address ecological risks if they exist.

DOE has been proactive in protecting the public by obtaining license agreements with property owners before issuing this ROD. Copies of the license agreements are maintained by the DOE Real Estate Office. If any future property owners refuse to execute license agreements, DOE shall take the legal steps necessary, as provided by CERCLA, to ensure human health and the environment are protected. Steps may include formally advising the property owner, the Oak Ridge city manager and the Anderson County Health Department environmentalist that contamination may exist and that DOE should investigate the proposed groundwater use before permits for use are issued.

The DOE Program Office will ensure that the title searches and appropriate notifications are made during the term of this ROD (i.e., until a final ROD is issued for the Upper EFPC CA). The DOE Real Estate Office and DOE's management and operations contractor's real estate office are

responsible for (1) completing the annual title search by the anniversary date of this ROD to determine whether any affected property has changed hands; (2) notifying property owners, the Oak Ridge city manager, and the TDEC/DOE Oversight Division of their obligations under the agreements and updating them on the status of the environmental investigations; (3) surveying owners by telephone to determine whether any new groundwater wells have been constructed or planned or there are any new uses for surface water; and (4) notifying licensed well drillers in Tennessee of the license agreements and their terms.

Although outside the scope of this ROD, current DOE monitoring plans include sampling at the existing well, spring, and Rogers Group, Inc., quarry monitoring locations in Union Valley. The TDEC/DOC Oversight Division will perform additional monitoring in Union Vally as described in the division's annual environmental monitoring plan. All monitoring results will be submitted to the DOE Program Office and to the TDEC/DOE Oversight Division.

The DOE Real Estate Office shall report search results to the DOE Program Office. The DOE Program Office will also act upon any notifications by property owners of proposed new uses or changes in use of surface water or groundwater within the interim remedial action boundary. The proposed uses will be investigated and, if found to be unacceptable, the DOE Real Estate Office will be advised to negotiate a separate agreement with the property owner prohibiting such unacceptable use with reasonable terms under the circumstances.

STATUTORY DETERMINATIONS

Section 121 of CERCLA establishes several statutory requirements and preferences, including compliance with ARARs. Statutory requirements specify preferences for cost-effectiveness, use of permanent solutions and innovative treatment technologies or resource recovery technologies to the maximum extent practicable, and finally a preference for use of treatment that permanently reduces the toxicity, mobility, or volume of hazardous substances. On-site interim remedial actions under CERCLA are required to attain only those ARARs specific to the action being implemented, and the above criteria apply to the selection of a final remedy.

This interim action is protective in the short term of human health through control and limitation of exposure to the contaminants and limitation of the potential spread of the contamination. There are no ARARs specific to this interim action. The action is cost-effective. DOE believes the selected interim action represents the best balance of trade-offs in terms of short-term effectiveness, implementability, and cost for its limited scope. The action does not utilize treatment and is not permanent, but does reduce the potential for acceleration of contaminant migration and is appropriate for an interim response. The statutory preference for treatment will be addressed by future cleanup decisions for the Upper EFPC watershed.

EXPLANATION OF SIGNIFICANT CHANGES

The interim proposed plan for Union Valley was released for public comment in August 1996. The proposed plan identified the institutional controls alternative as the preferred alternative. DOE received oral comments in the public availability session and written comments from three organizations and one individual during the public comment period. DOE, EPA, and TDEC reviewed the comments and determined that no significant changes to the remedy, as originally identified in the interim proposed plan, were necessary.

REFERENCES

- DOE (U.S. Department of Energy). 1996. Interim Proposed Plan for Union Valley, Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee, DOE/OR/02-1452&D2. Oak Ridge, TN.
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- ORNL (Oak Ridge National Laboratory). 1995. Union Valley Interim Study Remedial Site Evaluation, Y/ER-206/R1. Oak Ridge, TN.

PART 3. RESPONSIVENESS SUMMARY

This chapter documents the formal public comments on the Interim Proposed Plan for Union Valley, Upper East Fork Poplar Creek Characterization Area, Oak Ridge, Tennessee (DOE 1996) and the DOE response to the comments. DOE received oral comments in the public availability session and written comments from three organizations and one individual during the public comment period August 6-September 5, 1996.

The institutional controls alternative presented in the interim proposed plan is now the selected interim remedy for Union Valley, Upper EFPC CA. This decision is based on the administrative record for the Upper EFPC CA, including the interim proposed plan (DOE 1996), public comments, and other documents in the administrative record file for this site.

This chapter serves three purposes. First, it provides DOE, EPA, and TDEC with information about community concerns with the site and preferences regarding the preferred alternative presented in the interim proposed plan. Second, it demonstrates how public comments were integrated into the decision-making process. Third, it allows DOE to formally respond to public comments.

COMMUNITY PREFERENCES

DOE received 44 comments on the interim proposed plan. Oral comments from the August 7, 1996, public availability session were recorded. Written comments were received from the ORR Environmental Management Site-Specific Advisory Board, Oak Ridge Environmental Peace Alliance, UT Agricultural Experiment Station, and T. R. Wood.

INTEGRATION OF COMMENTS

Clarifications of the selected interim remedy were made based on suggestions in the comments, but these did not change the intent of the preferred alternative. The comments will also be considered during development of the Upper EFPC CA RI/FS.

UNION VALLEY PUBLIC AVAILABILITY SESSION

August 7, 1996

Comments provided by Sonya Johnson (DOE) from meeting participants

PUBLIC-1 COMMENT

To what extent has the source term impacted the Union Valley area?

Response: Contaminants associated with the Y-12 Plant have been detected in samples from two monitoring wells and two springs in Union Valley. The two monitoring wells, GW-169 and GW-170, are located on city of Oak Ridge property just west of the Remotec property. GW-169 monitors groundwater at depths of 9.1-10.6 m (29.7-34.7 ft) below ground surface (bgs). GW-170 monitors groundwater at depths of 31.7-47.8 m (104-156.9 ft) bgs. The contaminants have been detected in these two monitoring wells since 1990; reported concentrations have been variable, with higher concentrations in GW-170, the deeper well. Carbon tetrachloride and chloroform, the primary components of the source term originating from the Y-12 Plant (see Public-2 and Public-5 Responses), have been detected only in GW-170 at maximum concentrations of 200 and 95 ppb, respectively.

PCE and TCE have been detected in Union Valley monitoring wells, but available data suggest that the shallow PCE and TCE contamination may not be from the same source as the carbon tetrachloride and chloroform. Maximum PCE and TCE concentrations in GW-170 are 11 and 4 ppb, respectively. The maximum concentrations of PCE and TCE from GW-169 are 4 and 6 ppb, respectively.

The two springs where carbon tetrachloride was detected are near Illinois Avenue. Spring SCR7.1SP is south of Union Valley Road and west of Illinois Avenue. Carbon tetrachloride has been detected in this spring over the past several years, with a maximum concentration of 7 ppb. Spring SCR7.18SP is just east of Illinois Avenue and south of Union Valley Road. Carbon tetrachloride has been detected in one sample collected in March 1996 from this spring at a concentration of 4 ppb. PCE and TCE have been detected in these springs at maximum concentrations of 2 ppb.

The locations where the source term has been detected in Union Valley are underlain by the Maynardville Limestone, which is one of several geologic units that comprise Bear Creek Valley and Union Valley. The area at the surface that is underlain by the Maynardville Limestone is a relatively narrow band that extends along Bear Creek Valley and Union Valley. The Maynardville Limestone consists of limestone and dolostone, with interbedded shales. The unit is highly fractured and contains numerous cavities or karst features formed by the dissolution of the rock. Most of the karst features occur in the top 30 m (100 ft) of the limestone. The Maynardville Limestone transports groundwater and its associated contaminants eastward and acts as a drain for the Y-12 Plant (ORNL 1995).

The current assumption is that the springs in Union Valley and Scarboro Creek are discharge points for the groundwater in the Maynardville Limestone. Because Scarboro Creek is a discharge point, it is unlikely that the plume will move eastward beyond the creek. As noted in a June 2, 1995, letter from TDEC (see SSAB-13 Comment, OREPA-2 Comment, and SSAB-13 Response), the highly fractured nature of the bedrock underlying Union Valley suggests that it could transport contaminants in other directions; however, data from numerous wells at variable depths across the Y-12 Plant support the interpretation that the transport direction from the plant is almost

exclusively eastward and is contained in the Maynardville Limestone. The hydraulic gradient and, therefore, the flow direction are from other formations toward the Maynardville Limestone.

PUBLIC-2 COMMENTS

Has the source been specifically identified?

Response: Sources outside the Y-12 Plant have not yet been characterized. The TDEC Division of Superfund is initiating an investigation of other potential sources.

The Y-12 Plant used several million pounds of carbon tetrachloride between 1943 and 1946 in the electromagnetic separation process to produce enriched uranium. Carbon tetrachloride reacted with the starting material, which typically was uranium trioxide, to produce uranium tetrachloride. The uranium tetrachloride served as feed, material for the Calutrons, production now spectrographs used for the uranium separation process. Historical records suggest that the use of carbon tetrachloride to react with the starting material occurred in Buildings 9202, 9203, and 9205, which are near the east end of the plant. Floor drains and/or storm sewers apparently collected spills and leaks of solvents associated with the electromagnetic separation process. There is no evidence of releases of the uranium compounds to the groundwater in this area of the plant. Spills associated with railroad tanker cars transporting carbon tetrachloride at the Y-12 Plant also may be a source for groundwater contamination. Carbon tetrachloride appears to have been used at the plant after 1946, although in much smaller quantities, as a dry cleaning solvent.

Chloroform is a common laboratory chemical that apparently has been used at the Y-12 Plant, although specific applications are unclear. Available information suggests that the quantities of chloroform used throughout the plant were relatively small. Chloroform also is a breakdown product (via biodegradation) of carbon tetrachloride, and this is the probable origin of the chloroform present in the Y-12 Plant and Union Valley monitoring wells. Elevated concentrations of chloroform are almost exclusively associated with elevated carbon tetrachloride concentrations. In addition, chloroform may be a by-product of drinking water chlorination.

PCE was used as a vapor degreasing agent throughout the Y-12 Plant during the 1970s and 1980s and was discontinued in approximately 1987. Uranium machining operations also used PCE mixed with mineral oil as a machine coolant. Approximately 250,000 L (70,000 gal) of PCE were used each year for cooling applications; this use was discontinued in 1984 or 1985. Leaks and spills of PCE, either onto the ground or into storm drains, are potential sources of the groundwater contamination.

TCE has had two primary applications at the Y-12 Plant: as a cooling agent for various machine processes and as a plasticizer. A plasticizer is a substance added to plastics or other materials to retain softness and pliability in molds. TCE also is used widely in industry as a cleaner or degreaser, although the extent of this application at the Y-12 Plant is unknown. Currently, no specific information is available on the handling or disposal of TCE, which may also be a breakdown product of PCE. Spills or leaks of TCE onto the ground or into storm drains are potential sources of groundwater contamination.

It is important to note that the uses and processes described above are not ongoing at the Y-12 Plant and do not represent a continuing source of contaminants. Historical releases, which are now in the subsurface soil and in groundwater under the plant, do continue to contribute contaminants and are termed secondary sources. Public-5 Response discusses the secondary source of carbon tetrachloride in groundwater at the Y-12 Plant.

PUBLIC-3 COMMENTS

Will you get more specific with your information?

Response: As part of the Upper EFPC CA RI, available documentation on all potential sources in the Y-12 Plant area has been assembled into a compendium of information (Energy Systems 1996a) that includes historical and process information and data from samples collected at the site. The location of heavy carbon tetrachloride usage in the 1940s, for example, appears to have been Buildings 9202, 9203, and 9205, which are all near the east end of the Y-12 Plant. The railroad tanker cars would have been unloaded in this area, as well.

A large body of groundwater and surface water data, collected over the last 10 years, is available; the location and concentrations of contaminants that have moved off site to Union Valley are relatively well constrained. An adequate amount of data may already be available for the fate and transport evaluation in the RI. A workshop was convened in October 1996 to determine the need for additional data collection in support of the RI; the results of the workshop are not yet available.

PUBLIC 4-COMMENT

What is the proposed schedule for managing the source term?

Response: Monitoring of groundwater and surface water is ongoing, and this provides data that can identify any changes in concentration and location of the contaminants. The schedule for completion of the RI for the Upper EFPC CA and implementation of appropriate actions has not been finalized, but DOE intends to have a final ROD by September 2000. Management actions and schedules for source term will be defined in that ROD. Early actions are considered and may be taken before the final Upper EFPC CA ROD is issued.

PUBLIC-5 COMMENTS

How contaminated is the source term?

Response: Approximately 10 million gal of carbon tetrachloride were used in the 1940s for electromagnetic separation in the eastern and east-central areas of the plant. The amount spilled is unknown, and there are no current releases from plant operations. The highest concentrations of carbon tetrachloride detected in groundwater are in monitoring wells just to the southwest of New Hope Pond. Well GW-381; which monitors groundwater in the eastern end of the plant, 15.0-18.4 m (49.3-60.4 ft) bgs, has had maximum carbon tetrachloride and chloroform concentrations of 8,500 and 2,300 ppb, respectively. Well GW-382, which monitors groundwater 38.1-52.7 in (125-173 ft) bgs, has had maximum carbon tetrachloride and chloroform (a degradation product of carbon tetrachloride) concentrations of 7,400 and 1,100 ppb, respectively.

The maximum concentrations of carbon tetrachloride in these wells are high enough greater than 1 percent of the solubility limit) to suggest that the source is a nonaqueous-phase liquid. In other words, the carbon tetrachloride at these locations is concentrated enough to be in a liquid phase distinct from the groundwater in which it occurs. Because the density of carbon tetrachloride is greater than water, it is termed a dense nonaqueous-phase liquid (DNAPL). DNAPLs can act as secondary sources of groundwater contamination after the primary source of the contamination has been removed. In general, DNAPLs are difficult to remediate, especially in a fractured bedrock setting like the Y-12 Plant. Containment is a possible treatment option that will be evaluated in the FS.

In contrast, the highest PCE and TCE concentrations are in monitoring wells just to the north and west of New Hope Pond. Well GW-762, which is west of New Hope Pond and monitors groundwater

14.7-17.8 m (48.2-58.5 ft) bgs, has had maximum PCE and TCE concentrations of 1,400 and 75 ppb, respectively. Well GW-383, which is north of New Hope Pond and monitors groundwater 5.5-7.0 m (18.1-23.1 ft) bgs, has had maximum PCE and TCE concentrations of 510 and 190 ppb, respectively.

PUBLIC-6 COMMENT

Will the plume continue to get worse/spread?

Response: It is believed that, under existing conditions, the plume already has reached its terminus and is at a steady state. However, additional spreading cannot be dismissed, particularly if groundwater flow is altered, for example, through extraction of groundwater from new wells east of the plume.

PUBLIC-7 COMMENT

Does continued quarrying accelerate the movement of the plume or increase the contamination leaving the site?

Response: Our current understanding is that quarrying has not had an effect on plume movement. The quarry is approximately 2.4 km (1.5 miles) east of Scarboro Creek, which is thought to be a local groundwater discharge point. In other words, groundwater east of Scarboro Creek flows west toward the creek and discharges into it; groundwater west of Scarboro Creek flows east toward the creek and also discharges into it. The amount of pumping at the quarry is probably not significant enough to affect plume movement. The activities outlined in the interim proposed plan for Union Valley include a license agreement with property owners that would require the owners to notify DOE 90 days before any new extraction or use of groundwater. Any additional use of water or changes in water use, therefore, would be evaluated in advance.

PUBLIC-8 COMMENT

Has DOE ever sampled the water at the quarry at the west end of the turnpike in Oak Ridge (near the vacant gate going onto K-25 Site)?

Response: Not to our knowledge. The quarry in question is many miles from the subject plume, in different geologic formations, and not in the direction of groundwater flow from the plume affecting Union Valley.

PUBLIC-9 COMMENT

Stakeholder stated that she is surprised that DOE is using only six wells for monitoring the groundwater. Where are the six wells that DOE is using? Are they at two separate locations?

Response: The U.S. Geological Survey installed the six monitoring wells in Union Valley as part of a hydrologic investigation in 1986. The wells are at two locations: on the city of Oak Ridge property just west of the Remotec property and on the UT Arboretum property. The wells on city property include GW-169, GW-170, and GW-232, and the UT Arboretum wells include GW-171, GW-172, and GW-230. At each site, the three wells comprise a cluster that monitors discrete depth intervals. Wells GW-169 [total depth 13 m (42 ft)] and GW-171 [total depth 9.4 m (31 ft)] monitor the unconsolidated zone above bedrock. GW-170 [total depth 47.9 m (157 ft)] and GW-172 [total depth 40.8 m (134 ft)] monitor shallow bedrock. GW-232 [total depth 126 m (412 ft)] and GW-230 [total depth 124 m (406 ft)] monitor deeper bedrock.

The six wells are located within the relatively narrow band at the surface that is underlain by the Maynardville Limestone, which is the primary groundwater transport pathway from the Y-12

Plant (see the response to Public-1). In addition, DOE regularly monitors springs in Union Valley, which are discharge points for groundwater. The six wells at variable depths combined with the springs provide an accurate network to monitor in Union Valley. The TDEC DOE Oversight Division also monitors the same wells and springs and other locations in Scarboro Creek and the TDEC Division of Superfund is initiating additional monitoring at potential source areas in Union Valley.

PUBLIC-10 COMMENT

Is the plume at a point where it will impact the Oak Ridge landfill?

Response: Given the current understanding of the groundwater flow in this area, the plume is not likely to have an effect on the landfill because of the groundwater divide at Scarboro Creek. It is possible that contaminants from the plume could mix with landfill contaminants, but that is not likely to have an impact on the landfill.

PUBLIC-11 COMMENT

What's the concentration of carbon tetra..(I didn't catch the chemical name) in the plume?

Response: Refer to Public-5 Response.

PUBLIC-12 COMMENT

What type of remediation is DOE looking at for the DNAPLS? Is containment a consideration?

Response: A variety of remediation options will be evaluated and addressed as part of the FS for the Upper EFPC CA. The FS will be completed in 1999. Containment may be an effective remediation option for DNAPLS in fractured bedrock; therefore, it will be considered in the development and evaluation of alternatives. It may be considered as an early action.

PUBLIC-13 COMMENT

Have you studied the plume enough to know where it is going and how fast?

Response: We have enough groundwater and surface water data to ascertain the direction in which the plume is moving and its chemical composition. The fate and transport have not yet been evaluated rigorously; this evaluation will be completed in the Upper EFPC CA RI.

PUBLIC-14 COMMENT

Are the results of the public meeting going to be summarized and made available to the public?

Response: Yes.

PUBLIC-15 COMMENT

Stakeholder expressed concern that there is not better coverage in monitoring.

Response: Monitoring of the six wells and numerous springs in Union Valley is planned on a semiannual basis. The combination of groundwater locations (wells) and groundwater discharge locations (springs) have provided definition of the movement of the plume and temporal variation in contaminant concentrations.

PUBLIC-16 COMMENT

Stakeholder wants to see maps showing plumes.

Response: Plume maps have been prepared as part of the evaluation of existing data for the Upper EFPC CA RI and are available for distribution.

PUBLIC-17 COMMENT

In the document, add statement regarding the landfill being a state Superfund site to the last paragraph under the summary of risks on page 5.

Response: The interim proposed plan has been issued to the public and will not be revised. The statement in the public meeting that the closed municipal landfill in Union Valley was included on the Tennessee Superfund list was incorrect; the reference was to a different landfill. The TDEC Division of Superfund has been notified of the Union Valley landfill and is initiating investigations into potential releases or other hazards. This is acknowledged in this ROD.

OAK RIDGE RESERVATION ENVIRONMENTAL MANAGEMENT SITE-SPECIFIC

ADVISORY BOARD

BOB PEELLE, CHAIR

August 28, 1996

GENERAL COMMENTS

SSAB-1a COMMENT

The plan seems adequate for the immediate future, but the 5-year term seems questionable. If there is knowledge that no large quantity of carbon tetrachloride or other contaminant(s) exist(s) under the site so that future off-site concentrations will not increase, the plan would be more acceptable. The plan should include specific commitments for work in the near future if there is the possibility that concentrations will increase. The points of highest concentration on site must be sought, and corrective actions planned in the near future, not 5 years hence.

Response: The goals of this interim remedy are to prevent actions that would (1) put people at risk from existing contamination in Union Valley and (2) spread contamination farther than it has already reached. Existing data and projections are insufficient to predict whether contamination levels in Union Valley will increase or decrease. Final actions will be proposed through the CERCLA process under the Upper EFPC RI/FS, proposed plan, and ROD. The RI/FS, scheduled to be available for public review in April 1999, is underway and is investigating opportunities to remove or contain the groundwater contamination. Potential early actions are being investigated to determine whether effective, implementable, cost-effective actions can be taken before the final ROD that will not conflict with any potential findings in the ROD.

The analysis of the extent of the problem and the DOE contribution to that problem is incomplete. Additional interpretation of existing data, identification of additional data needs, collection of new data, and investigation of remediation options are still needed. If other sources contribute to groundwater contamination, then costly remediation efforts to remove or contain contamination sources at the Y-12 Plant could be wasted.

Source removal in the areas having the highest concentration of the carbon tetrachloride and associated contamination on site is not possible with any currently used or innovative technologies. Carbon tetrachloride is a DNAPL, which means that it is heavier than water, and has very low solubility. About 10 million gal of carbon tetrachloride were unloaded from railroad tankers and used in the 1940s at the Y-12 Plant. Spills on the ground during the unloading process and other operations likely contaminated the soil. Tens or hundreds of gallons of carbon tetrachloride may have flowed by gravity into the limestone karst bedrock underlying the Y-12 Plant.

The bedrock is full of fractures, crevices, solution conduits, and caves through which groundwater flows. Groundwater may flow over a pool of DNAPL that has been caught in a low spot or pocket in a conduit in the bedrock. Although it is not very soluble, a small volume of this DNAPL could bleed off enough dissolved carbon tetrachloride to contaminate groundwater above regulatory concentration levels (ppb) for hundreds or thousands of years. There are no technologies currently in use or being studied that can detect a small volume of DNAPL that could be from 3 to 300 m (10 to 1,000 ft) deep over an area of 40 ha (100 acres). Even if a DNAPL source could be found, there are no technologies that could ensure complete removal of such a source. Because it is likely that large volumes could have been spilled during historical operations, there could be many widely separated small sources. If one source is missed, groundwater contamination at unacceptable levels could continue.

Because it may be technically impractical to remediate the source and prevent groundwater from being contaminated, the Upper EFPC RI/FS is investigating ways to contain the plume and prevent further migration of contaminated groundwater beyond the Y-12 Plant property line. This may be possible, and several containment methods are under investigation. However, containment may be technically or economically impractical in the karst bedrock system. All of the methods investigated require installation and operation of mechanical systems (e.g., wells, pumps, treatment plants). These systems would have to be reliable until all of the DNAPL sources have naturally disappeared, that is, dissolved into the water and collected and treated by the mechanical systems. If a large DNAPL pool exists, containment may be required for hundreds of years.

SSAB-1b COMMENT

The overall effort should include the region where Scarboro Creek reenters Oak Ridge Reservation (ORR) south of the arboretum.

Response: The area in question has been studied and is not considered to pose any hazards. The RI/FS for the South Campus Facility (DOE/OR/02-1274/V1&D2) investigated DOE property west of and including Scarboro Creek. No unacceptable hazards were found in the creek, and a no action ROD (DOE/OR/02-1383&D3) was issued in December 1995. The Property east of Scarboro Creek was evaluated in September 1996 in the ER footprint reduction process, evaluation of Scarboro/East Haw Ridge study area (DOE/OR/01-1496&D1) and has been approved for release to the public. This document states "Findings indicate that no public health concern should arise because of past and present federal activities within the study area." Also, "The possibility of groundwater contamination from other affected areas of the ORR exists, and future groundwater use restrictions may be determined necessary. When and if the study-area is considered for transfer to a non-DOE use, additional sampling will be necessary to determine the need for groundwater use restrictions." DOE does not consider it necessary to expand the scope of the Union Valley interim action to include this area because (1) the water in the creek presently meets regulatory requirements, (2) TDEC is monitoring the creek and would recognize if contamination could migrate onto this property, and (3) the existing footprint reduction process would ensure investigation of future uses and protection from any projected risk.

SSAB-2 COMMENT

Many small readings are reported and then discounted. When questionable readings are obtained, they should be checked using more sensitive or reliable apparatus.

Response: The Upper EFPC remedial investigation is analyzing existing and new data outside the scope of this interim action. Results of analyses that report low concentrations are not discounted. The concentrations are compared to risk-based standards promulgated either by the state or federal government. When concentrations do not exceed these standards, they are not considered to be an imminent concern. DOE evaluates low-level readings to determine whether they represent the leading edge of a plume. Multiple rounds of data have been collected from some of the Union Valley sampling locations. The data typically are compiled and plotted to evaluate trends. Therefore, if a low concentration is followed by successively higher concentrations, the significance is noted and considered during data analysis.

SSAB-3 COMMENT

The proposed license system resembles buying short-term rights to pollute groundwater under the grantors land, an unacceptable concept used alone for a 5-year period.

Response: The license system does not purchase rights to pollute. It protects the public from

existing pollution caused by historic releases of contaminants. To the best of our knowledge, most of the carbon tetrachloride was likely released before 1946 during the Manhattan Project when ER and waste management were not given a high priority. Significant effort and expenditure is underway to investigate existing contamination, determine its risk, evaluate risks from other potential sources, and develop responsible and cost-effective remedial actions that will protect human health and the environment.

SSAB-4 COMMENT

Plans to notify local government are too vague. Recording the licenses at the Registrar of Deeds office should be considered.

Response: The responsibilities for notification are clearly established in the "Selected Remedy" section of this ROD. This is a tripartite agreement among DOE, EPA, and TDEC with sufficient checks and balances to ensure compliance for the approximately 4-year interim action.

SSAB-5 COMMENT

A revised document should be made more understandable to the general public.

Response: Your comment is appreciated. The interim proposed plan was written for the general public and with the intent that it be readily understandable. The purpose of issuing the proposed plan and the subsequent public meeting was not only to inform but also to involve the public in selection of an interim response to address any potential threat from contaminated groundwater in Union Valley. If public comments had indicated a lack of understanding of the situation or caused DOE to alter the selected remedy, a revised proposed plan could have been issued. However, comments received indicated an appreciation of the situation and general concurrence with the preferred alternative selected as the interim response. Thus, instead of reissuing the proposed plan, DOE is providing responses to public comments in this section of the ROD, according to provisions and requirements under CERCLA.

SSAB-6 COMMENT

Please indicate the source of standards and the method used to obtain contaminant standards.

Response: Three sets of standards were used for comparison in the evaluation of the Union Valley data. The first set is the EPA primary drinking water standard, called the Maximum Contaminant Limits (40 CFR 141). This risk-based set of standards is promulgated by the federal government. The second set is a set of background values for naturally occurring inorganic constituents in groundwater. The background values were established by the Lockheed Martin Energy Systems (Energy Systems) Groundwater Protection Office on the basis of statistical analysis of data from monitoring wells at the Y-12 Plant (Energy Systems 1996b). The third set of standards is the list of preliminary remediation goals developed by Energy Systems for the preliminary risk evaluation (ORNL 1995).

SSAB-7 COMMENT

The above comments are based on a concern that the reported observations show the leading edge of a serious groundwater plume.

Response: It is not yet clear whether the contaminants detected indicate the leading edge of a plume that is expanding eastward in Union Valley. As described in Part 2 under "Summary of Site Characteristics," Public-1 Response, and Public-7 Response, it is believed that the plume does not continue past the groundwater discharge point at the Scarborough Creek springs. Additional

investigation is underway for the Upper EFPC CA that will more clearly define the fate and, transport of contaminants in the plume.

SSAB-8 COMMENT

The interim Proposed Plan for the Union Valley Upper EFPC CA is based on the "Union Valley Interim Study Remedial Site Evaluation" (Y/ER-206/RI, February 1995). The TDEC, DOE Oversight Division, commented on this document in a letter dated June 2, 1995. The "UV Interim Study Remedial Site Evaluation" has not been redrafted in response to these comments. In this letter, a number of significant concerns were described, including questionable analyses of data and assumptions on the hydrogeology of the site. How have the concerns in this letter been addressed?

Response: Responses to the comments were prepared and submitted to TDEC shortly after the comments were received. The Union Valley interim study suggested that there were no current risks, only potential future risk if groundwater use changed. The study recommended no interim action. TDEC responded that the potential risk and potential for additional expansion of the groundwater plume justifies the need for interim action. This ROD was prepared to address TDEC's concerns. TDEC concurs with this ROD. The interim study will not be revised and reissued, and the analysis and evaluation of contamination in Union Valley originating from the Upper EFPC CA, incorporating other valid concerns of TDEC, will be completed as part of the Upper EFPC RI. Analytical methods have been changed based on TDEC comments, and more reliable radionuclide analyses are now being conducted. TDEC will approve all CERCLA documentation for Upper EFPC CA and will sign the final ROD.

SPECIFIC COMMENTS

SSAB-9 COMMENT

Page 1. Introduction, Paragraph 3: The word "limit" as used here suggests that DOE would approve of some level of "unacceptable activities." The word "limit" should be replaced with the word "prohibit."

Response: See response to SSAB-5 Comment. Similar language in this ROD has been modified as suggested.

SSAB-10 COMMENT

Page 3, Paragraph 1: In this paragraph, it is stated that there are six groundwater monitoring wells in Union Valley. These six wells actually consist of two locations, with three wells at each location (each well monitoring a different depth). These wells appear to be inadequate to characterize and monitor changes in the plume and should be supplemented. Please explain clearly that only two locations are involved and why only two locations are adequate.

In the last line of this paragraph, it is stated that "No contamination has been found in the groundwater at the quarry." Please describe the extent of sampling activities that have been conducted at the quarry and how certain DOE is that no contamination exists there.

Response: Refer to Public-9 Response for the issue of the adequacy of the six wells.

With respect to the issue of contaminants in the quarry, five samples have been taken from a spring that is discharging groundwater from one of the quarry walls. The most recent sample taken from the quarry was in early June 1996. The samples have been analyzed for volatile organic compounds (VOCs), which include carbon tetrachloride and other chlorinated solvents in

the plume, as well as inorganics (such as nitrate), metals, and radionuclides. The samples have not detected VOCs. The inorganics, metals, and radionuclides that have been detected have been at very low concentrations, either below the background values or below the standards described in SSAB-6 Response.

SSAB-11 COMMENTS

Page 3, Paragraph 2: In describing the use of water from Scarboro Creek for irrigation at the Arboretum, the text states that "Some potentially hazardous constituents have been detected in the springs that feed Scarboro Creek, but the source of these constituents has not been confirmed, nor has any risk from those constituents been established." Please list which contaminants and the levels of contamination that have been found in Scarboro Creek and describe what actions are being taken to determine the source of these constituents. Also, please indicate what precautions are being taken to prevent adverse effects on human health and the environment from the use of water from Scarboro Creek. Human health and the environment should be protected even though the source of the contamination has not been confirmed.

Response: In addition to carbon tetrachloride, other VOCs, metals, and radionuclides have been detected in surface water. A complete listing of contaminants and concentrations detected in groundwater and surface water in Union Valley is provided in the Union Valley Interim Study Remedial Site Evaluation (ORNL 1995). The relationship between the low levels of surface water contamination and releases from the Y-12 Plant is unclear. This relationship will be clarified in the Upper EFPC CA RI; however, identification of other potential sources in Union Valley is outside the scope of the RI. The state of Tennessee is initiating investigations of off-site sources.

At this time, no precautions to protect human health or the environment in Scarboro Creek are necessary. Should unacceptable contaminant levels be detected during monitoring by DOE or TDEC, precautions will be taken as described in SSAB-12 Response.

SSAB-12 COMMENTS

Page 3, Paragraph 3: Although this interim action is intended only to address contamination resulting from operations in the Upper EFPC CA, plans to investigate other potential sources either by DOE, TDEC, USEPA or another agency should be described.

Response: As described in Public-17 Response, the TDEC Division of Superfund is initiating an investigation of other potential sources in Union Valley. TDEC DOE Oversight Division and Division of Water Quality monitors contaminant levels in Scarboro Creek. Should contamination be detected above acceptable limits, TDEC could choose to post the creek, establishing the uses that are acceptable and those that are prohibited. To date, no such restrictions are necessary. Also, see SSAB-17 Response for a description of the DOE monitoring program.

SSAS-13 COMMENTS

Page 5, Paragraph 2: In this paragraph, it is stated that the plume is assumed to be contained in the Maynardville Limestone. Please describe the basis of the assumption that the plume is contained in the Maynardville Limestone and the degree of certainty that this assumption is correct. The assumption is questioned in the letter dated June 2, 1995, from TDEC, DOE Oversight Division, to DOE.

Also in this paragraph, it is stated that "Little contamination is expected at 300 m (1,000 ft) and below because there are fewer developed karst features at those depths and the formation is tighter." Is this conclusion based on a literature review or have core samples been collected

in Union Valley to confirm this theory? This is especially important near the source of the plume where DNAPL is suspected to be present.

Response: Regarding containment of the plume in the Maynardville Limestone, please refer to Public-1 (paragraphs 4 and 5), Public-6, and Public-7 Responses. With respect to the reference to the TDEC comment from 1995, responses were prepared and submitted to TDEC and additional actions are being taken (see SSAB-8 response).

With respect to the depth of contamination, the statement is based upon our understanding of the groundwater flow and transport as summarized in the site conceptual model. Many lines of evidence and data, including core evaluation, entered into the development of the model. Deep multiport monitoring wells at the east end of the Y-12 Plant GW-722 and GW-131 confirm the vertical extent of contamination. GW-722, in particular, intersects the carbon tetrachloride plume, and samples below approximately 170 in (550 ft) do not exhibit contamination.

SSAB-14 COMMENTS

Page 5, Summary of Risks, Paragraph 1: In this paragraph, it is stated that a number of organic, inorganic, and radioactive constituents were detected in Union Valley groundwater and surface water, but that the carbon tetrachloride-dominated plume is of particular interest because it originates from the Upper EFPC CA. Please include in the document what the source(s) of the other contaminants is (are) and how they are being addressed.

Response: Identification of other source(s) of contaminants is beyond the scope of the Upper EFPC CA RI, and these sources, if any, have not yet been evaluated. TDEC is investigating other potential sources (see Public-17 and SSAB-12 Responses). The institutional controls in the interim selected remedy should prevent unacceptable human exposure regardless of the source of contamination.

SSAB-15 COMMENT

Page 5. Summary of Risks, Paragraph 3: The last sentence says that "Ecological risk evaluations were not included in the Union Valley interim study." Please state whether ecological risk evaluations will be included in the Upper EFPC CA remedial investigation.

Response: Ecological risk evaluation is part of the Upper EFPC RI and results of the evaluation will be included in the RI report.

SSAB-16 COMMENTS

Page 5. Summary of Risks, Paragraph 4: In the last sentence, it is stated that "... some constituents could be found to originate from the municipal landfill or from other sources and would be outside the scope of this interim proposed plan." Although the municipal landfill and other sources may be outside of the scope of the plan, they are still a concern of the public. Therefore, the responsible local government agency should be notified and reference to this notification should be included in the plan. Please identify the municipal landfill and show the location.

Response: The golf driving range (119 Union Valley Road), which is north of and adjacent to the UT Arboretum, is located on the former Oak Ridge landfill. The location is shown in Figure 2.2 of this ROD. The landfill reportedly received municipal solid wastes. According to the Oak Ridge Community Development Office, Management Services, Inc., managed the landfill from the 1940s until it was acquired by the city in 1961. The exact closure date of the landfill is uncertain, but the lease to the driving range started on July 31, 1967. The TDEC Division of

Superfund is investigating the landfill.

SSAB-17 COMMENT

Page 6, Description of Alternative 2 (Institutional Controls): There is no mention of a groundwater or surface water monitoring program to ensure that the proposed institutional controls are adequate. The monitoring program that will be in place should be described (e.g., which monitoring wells and surface water location's would be sampled, sampled frequency, constituents analyzed).

Response: The purpose of this ROD for interim actions is to protect human health by ensuring that no one drinks potentially contaminated groundwater or surface water. The only monitoring needed to ensure this protectiveness is of water use, not contamination levels. Institutional actions are intended to preclude and monitor use. Outside the scope of this interim action ROD, an integrated monitoring plan for the ORR has been drafted and is being reviewed by DOE. In that plan, Union Valley monitoring includes the six monitoring wells (GW-169, GW-170, GW-171, GW-172, GW-230, and GW-232) sampled twice a year with analysis for VOCs and gross alpha and beta activity. Springs SCR7.1SP, SCR7.18SP, and the Rogers Group, Inc., quarry spring also would be sampled twice a year with analysis for VOCs and gross alpha and beta activity. Spring SCR7.8SP would be sampled twice a year for VOCs. Note that the plan is in review and these locations, frequencies, and analyses could change. TDEC will perform additional sampling at the wells, springs, landfill, and in Scarboro Creek.

SSAB-18 COMMENT

Page 6 ("Institutional Controls") and Page 8 ("Short-Term Effectiveness"): Annual title searches are discussed on Page 6 ("...DOE would institute an annual title search...") and on Page 8 ("...ensured by DOE's annual title searches and notifications..."). Please explain exactly who would do the title searches and describe what mechanisms will be in place to ensure that annual title searches are conducted.

Response: The responsibilities for performing the title searches are described in the "Selected Remedy" section of this ROD. Ensuring compliance with this requirement is addressed in SSAB-4 Response.

SSAB-19 COMMENT

Page 9. Costs, Paragraph 1: In this paragraph, the assumed 6-year duration of the interim actions is referenced. Please explain why the license term is six (6) years instead of five (5) years as stated in Item 2 of the license?

Response: When the interim proposed plan was written, the projected date for issuing the Upper EFPC CA ROD was the year 2002. The 6-year period suggested in the proposed plan was intended to end approximately when the new ROD is issued. The current schedule expects completion of the final ROD by 2000. The draft license agreement attached to the proposed plan and the signed agreements have 5-year terms, and provisions for canceling or renewing the licenses. The discrepancy was not intended, but should not affect the reliability of the license agreements in protecting public health or preventing actions that could spread the contamination.

OAK RIDGE ENVIRONMENTAL PEACE ALLIANCE
LINDA EWALD
August 24, 1996

OREPA-1 COMMENT

In general, the preferred alternative is better than no action at all concerning the Union Valley groundwater problem; however, I am concerned about a general weakness of information and assumptions that were made in the proposal. It states that there are six groundwater monitoring wells in Union Valley. There are just two locations with three wells each, and they are inadequate to characterize and monitor changes in the plume. It also states that "no contamination has been found in the groundwater at the quarry" without describing any sampling activities to prove the certainty. It refers to the use of Scarboro Creek water for irrigation of the arboretum and that "some potentially hazardous constituents have been detected in the springs ... but the source has not been confirmed." Please indicate which contaminants have been found in Scarboro Creek and what actions are being taken to determine the source. Also what precautions are being taken to prevent adverse effects on human health and the environment?

Response: Please see Public-9 Response regarding well locations in Union Valley. See Part 2. "Summary of Site Characteristics," for current interpretation of data. See SSAB-10 Response regarding sampling in the quarry and SSAB-11 Response regarding Scarboro Creek. The institutional controls proposed in this ROD will protect human health. No interim actions address adverse effects, if any, to the environment. No environmental impacts have been identified.

OREPA-2 COMMENT

The two assumptions of concern are that the plume is contained in the Maynardville Limestone. A tracer test conducted by the state indicated that groundwater flow in the Knox Group could be up-dip, cross-strike or along dissolutionally enhanced joints in three directions. And that "little contamination is expected at 300 m (1,000 ft) and below, because there are fewer developed karst features and the formation is tighter." Have core samples been collected to confirm this theory?

Response: Please see SSAB-13 Response.

OREPA-3 COMMENT

Since ecological risk evaluations were not included in the interim study, will evaluations be included in the Upper EFPC CA remedial investigation? And although contamination from the municipal landfill or other sources is outside the scope of the interim proposed plan, they are still a concern of the public. The responsible local government agency should be notified and this note included. Also the overall effort should include the region where Scarboro Creek reenters ORR south of the arboretum. And finally, there is not mention of a groundwater or surface water monitoring program to ensure proposed institutional controls are adequate.

Response: Please see SSAB-15 Response regarding ecological risk evaluations, SSAB-16 Response regarding the municipal landfill. SSAB-1b Response regarding ORR property south of the arboretum, and SSAB-17 Response regarding monitoring plans.

OREPA-4 COMMENT

The Union Valley contaminated groundwater plume is a serious situation and I hope this interim proposal is just the start of serious efforts to address the problem. Thank you for your attention.

Response: The Upper EFPC CA RI/FS is a serious effort to define the nature and extent of contamination on and off the main Y-12 Plant site, predict the fate and transport of contaminants, establish likely risk levels for current and future potential exposure scenarios, and develop appropriate, cost-effective remedies.

UNIVERSITY OF TENNESSEE AGRICULTURAL EXPERIMENT STATION
RICHARD M. EVANS, SUPERINTENDENT
September 6, 1996

UT-1 COMMENT

UT owns approximately 450 acres within the "Interim Remedial Action Boundary" as delineated in Figure 2 of the DOE plan. This property represents a significant portion of the UT Oak Ridge Forestry Experiment Station and Arboretum property. Necessarily, UT is concerned with any impact(s) or encumbrances which may limit full realizations of its research, educational, and program development potential.

On this property, the University of Tennessee carries out a comprehensive program of integrated forestry, wildlife, horticultural, environmental, and natural resources research and educational program. In addition, this land resource is vital to the University's public service programs at the arboretum, which benefits over 30,000 annual visitors and program participants. Critical to these programs is the development of various plant collections, demonstrations, and research plots, which require irrigation for establishment and maintenance. As acknowledged in the DOE plan, water from Scarboro Creek is presently used to meet these irrigation needs. However, the University has always considered the use of groundwater sources in future development of a more extensive irrigation system. The potential loss of this irrigation option is of significant concern to the University. If the use of groundwater were determined to be an unacceptable risk, other alternatives, as offered in the plan, would have to be explored.

Response: DOE intends to cooperate with UT in accordance with the terms of the license agreement and pursuant to the intent of this ROD. If UT establishes a specific need for additional irrigation water resources beyond the surface water currently available, determines that extraction of groundwater is the most economic source of supply, and notifies, DOE 90 days in advance of its plans, then DOE will evaluate the proposed use and determine whether the use is unacceptable. If the use is unacceptable because of current or historical DOE actions, then DOE will negotiate in good faith with UT to establish other resources such that UT's programs are not adversely affected and the cost to UT would not exceed the cost had the groundwater been available.

UT-2 COMMENTS

It is well known, and acknowledged in the plan, that visitors to the arboretum often "explore" Scarboro Creek and, in the process, come in contact with the water, wading or otherwise. Not addressed in the plan is the fact that Scarboro Creek is often used in the study of stream life and ecology by school groups in programmed visits to the arboretum, as well as in some adult-oriented arboretum programs. In these latter circumstances, contact with the water in Scarboro Creek is more than casual. The plan considers the potential health hazards of human contact with this water and states that, "No potential contaminants of concern were found for this exposure (wading) scenario." DOE is encouraged to consider an expanded "scenario" addressing the above described exposures in evaluating potential human health risk.

Response: The child-wading scenario referenced in the interim proposed plan assumes that 25 percent of an average (age 3-6 years, 33 lb) child's total body surface area is in contact with spring/surface water. The exposure duration is 1 hour per day, once a week for 6 months of the year for 6 years. Risks were calculated for dermal exposure and inhalation of volatile contaminants. Typically, this is considered a conservative scenario (i.e., protective of human

health for both children and adults) because children are more susceptible to contamination than adults, and modeled exposure duration is thought to be more lengthy than expected actual durations. Furthermore, the highest concentrations of contaminants where the springs emerge at the headwaters of Scarboro Creek were used in the calculations and volatile contamination is expected to attenuate downstream from the springs. The Upper EFPC CA RI will continue to evaluate contamination exiting the groundwater at spring SCR7.1SP. TDEC Division of Superfund's evaluation of the former Oak Ridge landfill (see Public-17 and SSAB-12 Responses), TDEC Division of Water Quality, and TDEC DOE Oversight Division will investigate contamination in the creek. If UT believes that the exposure scenarios described are not sufficiently conservative, they can contact DOE and identify other exposure durations or pathways for consideration in the Upper EFPC CA RI/FS.

UT-3 COMMENT

Prior to receipt of this Plan, DOE and UT negotiated a Real Estate License Agreement (Recorder-7-96-0155) pertaining to the sampling of groundwater wells and miscellaneous environmental sampling. In the spirit of this agreement and a common concern for the environmental impact of these contaminants on the water and land resources, UT supports and encourages DOE's efforts in monitoring and remediation. In recognition of the environmental linkage of University programs to the land, water, plant, and animal resources on this property, I request that we be kept fully informed on all future findings and actions which may impact this property.

Response: This ROD requires annual notification of parties to license agreements updating them on the status of the environmental investigations. Any special findings during investigations that indicate a potential to adversely impact public health will be immediately communicated to all affected parties.

T. R. WOOD
104 MEADOWLARK LANE
OAK REDGE, TN 37830
September 4, 1996

WOOD-1 COMMENT

I would like to provide a comment on the interim proposed plan for the Union Valley/Upper East Fork Poplar Creek area. I am concerned about the institutional controls, restrictions in groundwater use, and future uses for the areas impacted by the groundwater plume.

The areas involved are planned for industrial development as a primary land use. Several manufacturing and commercial offices are established. One concern I would have would be that restricting the use of groundwater for industrial (nondrinking water) purposes might limit the potential for future growth. An industry needing process water might not locate here if these restrictions apply, which would severely limit the future designated land use. Existing industries, such as Rogers Group, Inc., quarry operations, will be limited in their growth potential. They presumably will be limited in their ability to dewater the quarry pit and the life of the mine will be reduced. (If contaminants are detected in their quarry pit pumping operations, will DOE pay to clean them up? Since the source of the contamination is DOE operations, I do not see where the quarry should be found liable!)

I would like the institutional controls to be limited to restricting targeted land/groundwater use, such as housing with residential wells, but I would not like to see industry restricted in any way. DOE should pay to remove any solvents that would need to be removed by process water extraction wells within the time limits of natural attenuation of the contaminants in this area. Even use of the water to irrigate a golf course should not be considered unreasonable!

In addition, the institutional controls should not limit the future surface use of the land, if for example, the Rogers Group, Inc., quarry were to close and the area were to be used as a park or a future elementary school site for the new Rivers Run and Parcel A communities. This future land use should be allowed. The lands owned by the city of Oak Ridge in the area should also be likewise unencumbered. The available land in Oak Ridge is scarce enough, without unreasonable restrictions applied to land that was previously contaminated by DOE, but is now owned by others. Off-site releases are not usually mitigated by institutional controls on groundwater; if this precedent is carefully crafted, it may be a landmark event for DOE. The precedent will also help reuse efforts at other on site areas of groundwater contamination. Let's think this through carefully!

Response: DOE shares your concern regarding restrictions on any uses, particularly industrial uses, on any property on or off of the ORR. However, in the interest of protecting public health from existing contamination from historical releases, the interim restrictions required by this ROD are necessary until enough information is available and reasonable actions to correct the problem can be evaluated and implemented.

It is true that restricting groundwater use might limit use of the property for certain water-intensive industries and limit the potential for future growth. DOE believes that this restriction is not as severe as characterized in your letter. Most of the existing industries in this area are not large users of water. Because of the abundance of surface water in East Tennessee, those that are typically are located near surface water sources rather than groundwater sources. Regardless of contamination levels, it is unclear whether the aquifer in

Union Valley can yield a sufficient quantity of water for some industrial uses. City of Oak Ridge water is available, and surface water from Melton Hill Lake is nearby and could be accessed for industrial use.

Continued dewatering at Rogers Group, Inc., quarry or expansion of their quarrying activities is not expected to affect the contamination plume (see Public-7 Response). The only concern at Rogers Group, Inc., quarry is if the owners use groundwater for drinking; this is only a potential future concern because no contaminants have been detected at the quarry. Any drinking water source would need to be treated for naturally occurring bacteria and other pathogens. DOE is responsible for the contamination associated with the carbon tetrachloride-dominated plume. Other parties may be responsible for other contamination in Union Valley. If remediation is not technically possible (see SSAB-1a Response) or the remediation cost to DOE and the taxpayer is not commensurate with the added value that water intensive industry could provide, then groundwater use restrictions may be the most appropriate way to protect human health and prevent the spread of contamination.

The interim proposed plan and this ROD do not prohibit groundwater use. Owners are required to notify DOE if new uses are proposed or if the property is to be sold. DOE will investigate proposed new uses and, only if they are unacceptable, negotiate an agreement with the property owner. Because the negotiated agreement would be acceptable to the owner, industrial development under the restrictions necessary to protect the public should not be impeded.